CLAIMS

What is claimed is:

1. A method of classifying a cardiac response to a pacing stimulation, comprising:

delivering the pacing stimulation to a heart;

establishing a first classification window subsequent to delivery of the pacing stimulation;

sensing a cardiac signal in the first classification window;

establishing a second classification window if a trigger characteristic of the cardiac signal is detected in the first classification window;

sensing the cardiac signal in the second classification window if the second classification window is triggered; and

classifying the cardiac response to the pacing stimulation based on one or more characteristics of the cardiac signal.

2. The method of claim 1, further comprising triggering one or more additional cardiac response classification windows based on one or more additional trigger characteristics.

3. The method of claim 2, wherein triggering the one or more additional cardiac response classification windows based on the one or more additional trigger characteristics comprises triggering the one or more additional cardiac response classification windows based on lack of sufficient information to classify the cardiac response.

4. The method of claim 1, wherein delivering the pacing stimulation comprises delivering a unipolar pacing stimulation.

5. The method of claim 1, wherein delivering the pacing stimulation comprises delivering a bipolar pacing stimulation.

6. The method of claim 1, wherein delivering the pacing stimulation to the heart comprises delivering the pacing stimulation a right atrium.

7. The method of claim 1, wherein delivering the pacing stimulation to the heart comprises delivering the pacing stimulation to a left atrium.

8. The method of claim 1, wherein delivering the pacing stimulation to the heart chambers comprises delivering a first pacing stimulation to a right ventricle.

9. The method of claim 1, wherein delivering the pacing stimulation to the heart chambers comprises delivering a first pacing stimulation to a left ventricle.

10. The method of claim 1, wherein:

delivering the pacing stimulation to the heart comprises delivering the pacing stimulation using an electrode combination; and

sensing the cardiac signal following the pacing stimulation comprises sensing the cardiac signal using the same electrode combination.

11. The method of claim 1, wherein:

delivering the pacing stimulation to the heart comprises delivering the pacing stimulation using an electrode combination; and

sensing the cardiac signal following the pacing stimulation comprises sensing the cardiac signal using a different electrode combination.

12. The method of claim 1, wherein sensing the cardiac signal following the pacing stimulation comprises sensing the cardiac signal using an electrode combination that reduces a pacing artifact signal relative to an evoked response signal.

13. The method of claim 1, wherein the trigger characteristic comprises a feature of the cardiac signal detected within a timing range.

14. The method of claim 1, wherein the trigger characteristic comprises a feature of the cardiac signal detected within an amplitude range.

15. The method of claim 1, wherein the trigger characteristic comprises a peak of the cardiac signal detected within an amplitude range and a time range.

16. The method of claim 1, wherein establishing the second classification window comprises defining the second classification window subsequent to the first classification window.

17. The method of claim 16, wherein establishing the second classification window subsequent to the first classification window comprises defining a delay between the first classification window and the second classification window.

19. The method of claim 1, wherein classifying the cardiac response comprises classifying the cardiac response as a captured response.

20. The method of claim 1, wherein classifying the cardiac response comprises classifying the cardiac response as a non-captured response combined with an intrinsic beat.

21. The method of claim 1, wherein classifying the cardiac response comprises classifying the cardiac response as a non-captured response.

22. The method of claim 21, further comprising delivering a back up pacing stimulation if the cardiac response is classified as the non-captured response.

23. The method of claim 22, wherein one or more additional cardiac response classification windows are triggered if the pace up pacing stimulation is delivered.

24. The method of claim 1, wherein classifying the cardiac response based on the one or more characteristics comprises classifying the cardiac response as a non-captured response if an amplitude of the cardiac signal remains below a threshold value.

25. The method of claim 1, wherein classifying the cardiac response based on the one or more characteristics of the cardiac signal comprises classifying the cardiac response as a non-captured response added to an intrinsic beat based on a peak of the cardiac signal detected in the first classification window.

26. The method of claim 25, wherein classifying the cardiac response based on the one or more characteristics of the cardiac signal comprises:

defining an intrinsic detection region in the first classification window; and

detecting a peak of the cardiac signal in the intrinsic detection region.

27. The method of claim 1, wherein classifying the cardiac response based on the one or more characteristics of the cardiac signal comprises classifying the cardiac response as a fusion/pseudofusion beat based on one or more characteristics of the cardiac signal detected in the first classification window.

28. The method of claim 27, wherein classifying the cardiac response as a fusion/pseudofusion beat based on the one or more characteristics of the cardiac signal detected in the first classification window comprises classifying the cardiac response as a fusion/pseudofusion beat based on a peak of the cardiac signal detected in the first classification window.

29. The method of claim 1, wherein classifying the cardiac response based on the one or more characteristics of the cardiac signal comprises classifying the cardiac response as a fusion/pseudofusion beat based on one or more characteristics of the cardiac signal detected in the first and the second classification windows.

30. The method of claim 29, wherein classifying the cardiac response as the fusion/pseudofusion beat based on the one or more characteristics of the cardiac signal detected in the first and the second classification windows comprises classifying the cardiac response as the fusion/pseudofusion beat based on a first peak of the cardiac signal detected in the first classification window and a second peak of the cardiac signal detected in the second classification window.

31. The method of claim 1, wherein classifying the cardiac response based on the one or more characteristics of the cardiac signal comprises classifying the cardiac response as a captured response based on first and second characteristics respectively detected in the first and the second classification windows.

32. The method of claim 1, wherein classifying the cardiac response comprises classifying the cardiac response as a captured response based on first and second peaks respectively detected in the first and the second classification windows.

33. The method of claim 1, wherein classifying the cardiac response comprises:

defining first and second capture detection regions; and

detecting a first peak of the cardiac signal in the first capture detection region;

detecting the second peak of the cardiac signal in the second capture detection region; and

classifying the cardiac response as a captured response.

34. The method of claim 1, wherein classifying the cardiac response comprises classifying the cardiac response comprises defining one or more detection regions respectively associated with one or more cardiac response types.

35. The method of claim 34, wherein defining the one or more detection regions comprises defining one or more capture detection regions associated with a captured response.

36. The method of claim 34, wherein defining the one or more detection regions comprises defining one or more intrinsic detection regions associated with a non-captured response combined with an intrinsic beat.

37. The method of claim 34, wherein the detection regions are characterizable as functions of time and amplitude.

38. The method of claim 34, wherein defining the one or more detection regions comprises initializing the detection regions.

39. The method of claim 34, wherein defining the one or more detection regions comprises adapting the detection regions.

40. A medical device, comprising:

a pulse delivery system configured to deliver a pacing stimulation to a heart;

a sensing system configured to a sense cardiac signal following delivery of the pacing stimulation;

a control system, coupled to the sensing system, and configured to establish a first classification window subsequent to delivery of the pacing stimulation, establish a second classification window if a trigger characteristic of the cardiac signal is detected in the first classification window, and classify the cardiac response to the pacing stimulation based on one or more characteristics of the sensed cardiac signal.

41. The medical device of claim 40, wherein the pulse delivery system is configured to deliver the pacing stimulation to a right ventricle.

42. The medical device of claim 40, wherein the pulse delivery system is configured to deliver the pacing stimulation to a right atrium.

43. The medical device of claim 40, wherein the pulse delivery system is configured to deliver the pacing stimulation to a left ventricle.

44. The medical device of claim 40, wherein the pulse delivery system is configured to deliver the pacing stimulation to a left atrium.

45. The medical device of claim 40, wherein the sensing system is configured to sense the cardiac signal using a defibrillation electrode.

46. The medical device of claim 40, wherein the sensing system is configured to sense the cardiac signal using a right ventricular coil electrode and a can electrode.

47. The medical device of claim 40, wherein the sensing system is configured to sense the cardiac signal using a right ventricular coil electrode and a can electrode tied to an SVC coil electrode.

48. The medical device of claim 40, wherein the trigger characteristic comprises a characteristic of the cardiac signal detected within an amplitude range and a time range.

49. The medical device of claim 40, wherein the second classification window is established subsequent to the first classification window.

50. The medical device of claim 40, wherein the control system is configured to classify the cardiac response as a captured response.

51. The medical device of claim 40, wherein the control system is configured to classify the cardiac response as a fusion/pseudofusion beat.

52. The medical device of claim 40, wherein the control system is configured to classify the cardiac response as a non-captured response combined with an intrinsic beat.

53. The medical device of claim 40, wherein the control system is configured to classify the cardiac response as a non-captured response.

54. The medical device of claim 40, wherein the pacing stimulation delivery system is further configured to deliver a back up pacing stimulation if the cardiac response is classified as a non-captured response.

55. The medical device of claim 40, wherein the control system is configured to define one or more detection regions respectively associated with one or more cardiac response types.

56. The medical device of claim 55, wherein the control system is configured to initialize the one or more detection regions.

57. The medical device of claim 55, wherein the control system is configured to adapt the one or more detection regions.

58. The medical device of claim 40, wherein the control system is configured to define one or more capture detection regions associated with a captured response.

59. The medical device of claim 40, wherein the control system is configured to define one or more intrinsic detection regions associated with a non-captured response combined with an intrinsic beat.

60. The medical device of claim 40, wherein the detection regions are characterizable as functions of time and amplitude.

61. A medical system, comprising:

means for delivering the pacing stimulation to a heart;

means for establishing a first classification window subsequent to delivery of the pacing stimulation;

means for sensing a cardiac signal in the first classification window;

means for establishing a second classification window if a trigger characteristic of the cardiac signal is detected in the first classification window;

means for sensing the cardiac signal in the second classification window if the second classification window is triggered; and

means for classifying the cardiac response to the pacing stimulation based on one or more characteristics of the cardiac signal.

62. A medical system, comprising:

means for delivering the pacing stimulation to a heart;

means for establishing a first classification window subsequent to delivery of the pacing stimulation;

means for sensing a cardiac signal in the first classification window;

means for establishing a second classification window if a trigger characteristic of the cardiac signal is detected in the first classification window;

means for sensing the cardiac signal in the second classification window if the second classification window is triggered;

means for defining one or more detection regions respectively associated with one or more cardiac response types;

means for detecting one or more cardiac signal peaks; and

means for classifying the cardiac response to the pacing stimulation based on a relationship between the cardiac signal peaks and the detection regions.